

may take large amounts of laxatives for postoperative constipation, leading to the "cathartic colon." If this had been so in our study we would have expected more use of laxatives by the women who had had hysterectomy than we found, although such use might have been underreported deliberately. Another possible mechanism is pelvic autonomic denervation due to an intraoperative manoeuvre,⁵ traction during the operation, or realignment of the pelvic organs after removal of the uterus.

Urinary dysfunction is a well recognised complication of hysterectomy and is thought to be due to disruption of the nerve supply to the bladder. We found a highly significant association between persistently reduced bowel frequency and persistently increased urinary frequency after hysterectomy. This supports the hypothesis that they may have a common aetiology—namely, autonomic denervation of both

viscera, which have a closely related nerve supply in the pelvis.

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Radioiodine in human thyroid glands and incidence of thyroid cancer in Cumbria

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Concern is increasing over the association between ionising radiation and cancers in populations living close to nuclear installations such as Sellafield in Cumbria. Because the external radiation in Cumbria is only marginally above the national average¹ any appreciable additional dose would have to come from manmade sources of radioactivity.

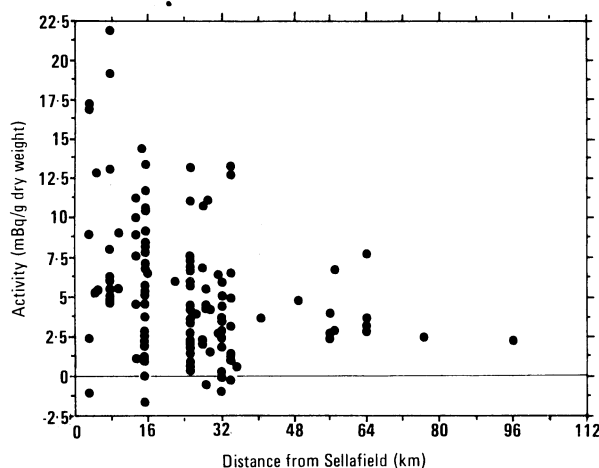
Both iodine-129 and iodine-131 are discharged from Sellafield into the sea and the atmosphere and since the early 1960s have probably contributed equally to the small additional dose^{2,3} to the thyroid above that of natural background radiation. We measured ¹²⁹I activity in thyroid glands in the population of Cumbria and related them to the incidence of thyroid cancer in the area. Inevitable delays in carrying out these measurements excluded an assessment of ¹³¹I, which has a half life of eight days (that of ¹²⁹I is 15 million years).

November 1984 and September 1987. The thyroid samples were homogenised and dried, and ¹²⁹I activity was measured in a thin walled scintillation detector over 100 minutes. Background levels (which varied during the examination) were subtracted from the count rate for the sample, and occasional negative values resulted. The figure (left) shows ¹²⁹I activity in individual thyroid glands plotted against the distance of the patients' homes from Sellafield. Levels of radioactivity decreased with distance (Spearman's rho = -0.392, p < 0.001).

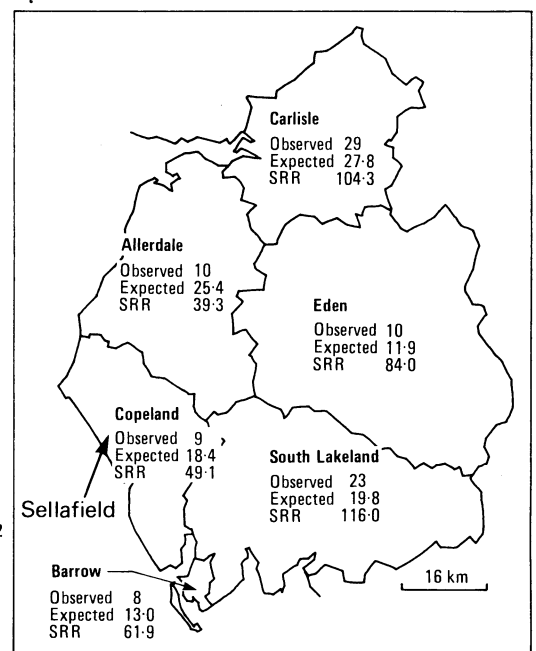
We also examined the incidence of thyroid cancer, using data from the Northern regional cancer registry for 1969-86. Age standardised registration rates and ratios were calculated by applying the national values for the midpoint of the period. Surprisingly, there was a positive correlation between the distance from Sellafield and the incidence of cancer, with higher incidences being found with greater distance (Spearman's rho = 0.541, p = 0.0007) (figure (right)). In the 40 (out of 288) parishes where thyroid cancers occurred the incidence varied from 0.39 to 40.46/100 000. Calculations using the Poisson distribution,⁴ however, showed only two parishes with significant increases in thyroid cancer: one was 16 km from Sellafield (two cases registered v 0.1 expected, p < 0.01) and the other 24 km away (four cases registered v 0.5 expected, p < 0.01). In Cumbria

Methods and results

Measurements were made on 130 thyroid glands taken opportunistically at necropsy from adults (mean age 67) dying from various causes in Cumbria between



Left: ¹²⁹I activity in thyroid tissue taken at necropsy related to distance of patients' homes from Sellafield. Right: registrations of thyroid cancer in Cumbria, 1969-86
SRR = Standardised registration ratio



overall there were fewer cases than expected (male, 19 cases *v* 31.2 expected; female, 71 cases *v* 85.0 expected). Within the parishes that formed the Copeland area around Sellafield nine cases were registered compared with 18.4 expected.

Comment

The decrease in radioactivity with distance from Sellafield is probably due to several factors, including the pattern of distribution of milk, which is generally assumed to be the principal source of ¹²⁹I. Several points emerged from the study. Firstly, the specific activities varied widely even within the same residential area. This could be due to natural variation and differing diet as well as to the varying amounts of time people spend away from their homes. Secondly, the activities were low, most being under 10 mBq/g dry weight and none above 22 mBq/g. This indicates that most of the sample population received less than an additional 0.67 µSv/year from this source,⁵ and none are likely to have received more than an additional 1.5 µSv/year. This is small compared with the dose to the thyroid from normal background radiation, which in

the Sellafield area is about 1000 µSv/year. Any cancers induced by this additional dose of ¹²⁹I are therefore unlikely to be detected above the natural incidence of the disease.

Even if higher levels of radioactivity occurred in the past these have not produced any detectable increase in the incidence of thyroid cancer. Two parishes with a significantly increased incidence were some distance from Sellafield; the increased incidence would therefore seem to be unrelated to any radioactive discharge from the nuclear fuel reprocessing works.

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Extension of selection criteria for extracorporeal shock wave lithotripsy for gall stones

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Extracorporeal shock wave lithotripsy and dissolution treatment for gall stones have yielded encouraging results.^{1,2} Selection criteria, however, seem arbitrary and based on those already established for treatment with bile salts.³ As such criteria may restrict the number of patients treated we therefore extended the criteria and report our experience.

Patients, methods, and results

We treated 62 patients as outpatients between August 1987 and June 1988 (12 male, 50 female; mean age 46 (range 11-81)). Patients were selected if they had (a) symptomatic gall stone disease; (b) radiolucent stones of any size or number or radio-opaque stones ≤3 cm; and (c) a functioning gall bladder on oral

cholecystography. Thirteen patients were excluded: four failed to return after the first treatment, two emigrated, one became pregnant, and two could not tolerate bile salt treatment; lithotripsy was abandoned in four because of difficulty in visualising the gall bladder.

All patients received combination dissolution treatment comprising chenodeoxycholic and ursodeoxycholic acid 7 mg/kg/day each, administered as one tablet (Lithofalk), and one capsule of a terpene mixture (Rowachol) three times daily. Ultrasonography was used to focus the shock waves from a piezoelectric lithotripter on the stones within the gall bladder. Each patient received 6000 shock waves in each treatment session (frequency 2.5 shock waves/s, 100% power) up to a maximum of six treatments at intervals of two to three weeks. All patients were followed up every month clinically and by ultrasonography. Two consecutive ultrasound scans and an oral cholecystogram were required to establish that the stones had been cleared.

The 49 patients received 175 sessions of shock wave treatment, each patient requiring an average of three treatments (range one to six). The table shows the outcome related to number, size, and type of stones. We classified patients into four groups. One group comprised those in whom all stones were cleared (n=27; median follow up six months (95% confidence interval 4.8 to 7.5) to time of clearance). The second group comprised those with ≥50% clearance—that is, fragmentation with appreciable clearance of stones (n=10; median follow up nine months). The third group comprised those with <50% clearance—that is, fragmentation with little clearance of stones (n=2; median follow up seven months). The fourth group comprised patients who had insignificant fragmentation or clearance of fragments after six treatment sessions and follow up of six months (n=10).

Thirty one patients, including 16 of the 27 in whom all stones were cleared, would not have been deemed suitable for lithotripsy by previous criteria.^{1,2} Lithotripsy was generally well tolerated. Eight patients suffered biliary colic during follow up, which usually occurred within 48 hours after lithotripsy. One patient in whom treatment failed had transient jaundice four days after treatment, which resolved spontaneously. None had skin ecchymosis or haematuria or any clinical or biochemical evidence of acute pancreatitis.

Clearance of gall stones with shock wave lithotripsy in 49 patients based on stone profile

No of stones	Size of stones (cm)	Clearance of stones			
		100%	≥50%	<50%	0
Radiolucent stones					
1	<1	1			
	2-3	6	1		2
	3-5			1*	1*
2, 3	<1	3	2		
	2-3	1	2		
≥4	<1	12*	4*	1*	2*
	2-3	1*	1*		1*
Radio-opaque stones					
1	2-3				2*
2, 3	2-3	1*			
	<1	1*			1*
≥4	2-3	1*			1*
Total		27	10	2	10

*Patients who would not have been eligible for treatment with established selection criteria.